CLAIMS

What is claimed is:

1. An echo canceler circuit comprising:

pre-noise suppression logic operative to receive pre-echo canceler uplink data and downlink data and in response to produce pre-noise suppression uplink data;

echo canceler coefficient logic, operatively coupled to the pre-noise suppression logic, and operative to receive the pre-noise suppression uplink data and the pre-echo canceler uplink data and in response to produce filter coefficient data;

noise suppression logic, operatively coupled to the pre-noise suppression logic, and operative to receive the pre-noise suppression uplink data and in response to produce noise suppressed uplink data; and

an echo canceler filter, operatively coupled to the noise suppression logic and to the echo canceler coefficient logic, and operative to receive the noise suppressed uplink data and the filter coefficient data and in response to produce final uplink data.

2. The echo canceler circuit of claim 1 wherein the pre-noise suppression logic includes a pre-noise suppression echo canceler adaptive filter.

3. The echo canceler circuit of claim 1 wherein the pre-echo canceler uplink data includes echo component data, such that the echo canceler filter produces the final uplink data with reduced echo component data.

4. The echo canceler circuit of claim 1 wherein the pre-echo canceler uplink data includes echo component data and noise component data, such that the final uplink data includes reduced echo component data and reduced noise component data.

5. An echo canceler circuit comprising:

pre-noise suppression logic operative to receive pre-echo canceler uplink data and downlink data and in response to produce pre-noise suppression uplink data;

a filter coefficient data generator operative to receive the pre-echo canceler uplink data and post-echo canceler uplink data and in response to produce echo estimation data and filter coefficient data;

adder logic, operatively coupled to the pre-noise suppression logic and to the filter coefficient data generator and operative to receive the pre-noise suppression uplink data and the echo estimation data and in response to provide the post-echo canceler data to the filter coefficient data generator;

noise suppression logic, operatively coupled to the pre-noise suppression logic and operative to receive the pre-noise suppression uplink data and in response to produce noise suppressed uplink data; and

an echo canceler filter, operatively coupled to the noise suppression logic and to the filter coefficient data generator, and operative to receive the noise suppressed uplink data and the filter coefficient data and in response to produce final uplink data.

6. The echo canceler circuit of claim 5 wherein the pre-noise suppression logic includes:

a pre-noise suppression coefficient data generator operative to receive the downlink data and in response to produce pre-noise suppression coefficient data;

a pre-noise suppression filter, operatively coupled to the pre-noise suppression coefficient data generator, and operative to receive the pre-noise

suppression coefficient data and in response to produce pre-noise suppression echo estimation data; and

pre-noise suppression adder logic, operatively coupled to the pre-noise suppression filter and to the adder logic, and operative to receive the pre-echo canceler uplink data and the pre-noise suppression echo estimation data and in response to produce the pre-noise suppression uplink data.

7. The echo canceler circuit of claim 5 including:

a digital to analog converter operative to receive the downlink data and in response to produce a downlink audio signal;

an amplifier, operatively coupled to the digital to analog converter, and operative to receive the downlink audio signal and in response to produce an amplified downlink audio signal;

a microphone operative to receive at least a portion of the amplified downlink audio signal and in response to produce a pre-echo canceler uplink signal; and

an analog to digital converter, operatively coupled to the microphone, the pre-noise suppression logic, and to the filter coefficient data generator, and operative to receive the pre-echo canceler uplink signal and in response to produce the pre-echo canceler uplink data.

8. The echo canceler of claim 7 further including at least one speaker, operatively coupled to the amplifier, and operative to receive the amplified downlink audio signal and in response to produce a downlink acoustic signal, and wherein the microphone produces the pre-echo canceler uplink signal in response to the downlink acoustic signal.

9. A communication apparatus comprising:

a housing having coupled therewith:

an echo canceler circuit within the housing including:

pre-noise suppression logic operative to receive pre-echo canceler uplink data and downlink data and in response to produce pre-noise suppression uplink data;

echo canceler coefficient logic, operatively coupled to the pre-noise suppression logic, and operative to receive the pre-noise suppression uplink data and the pre-echo canceler uplink data, and in response to produce filter coefficient data;

noise suppression logic, operatively coupled to the pre-noise suppression logic, and operative to receive the pre-noise suppression uplink data and in response to produce noise suppressed uplink data;

an echo canceler filter, operatively coupled to the noise suppression logic and to the echo canceler coefficient logic, and operative to receive the noise suppressed uplink data and the filter coefficient data and in response to produce final uplink data; and

a transceiver, operatively coupled to the echo canceler filter and to the pre-noise suppression logic, and operative to receive the final uplink data from the echo canceler filter and in response to transmit the final uplink data, and to provide the downlink data to the pre-noise suppression logic.

10. The communication circuit of claim 9 wherein the transceiver is at least one of a wireless wide area network (WWAN) transceiver, a wireless local area network (WLAN) transceiver and a wireless device.

11. The communication circuit of claim 9 wherein the pre-echo canceler uplink data includes echo component data and noise component data, such that the final uplink data includes reduced echo component data and reduced noise component data.

12. The communication apparatus of claim 10 further including a location information generator operative to produce location information, wherein the echo canceler circuit includes:

one or more processing devices operatively coupled to the location information generator; and

memory containing instructions executable by the one or more processing devices to cause the one or more processing devices to receive the location information and in response to provide the location information to the transceiver, wherein the transceiver transmits the location information.

13. An in-vehicle communication system comprising:

an echo canceler circuit comprising:

pre-noise suppression logic operative to receive pre-echo canceler uplink data and downlink data, and in response to produce pre-noise suppression uplink data;

echo canceler coefficient logic, operatively coupled to the pre-noise suppression logic, and operative to receive the pre-noise suppression uplink data and the pre-echo canceler uplink data, and in response to produce filter coefficient data;

noise suppression logic, operatively coupled to the pre-noise suppression logic, and operative to receive the pre-noise suppression uplink data and in response to produce noise suppressed uplink data;

an echo canceler filter, operatively coupled to the noise suppression logic and to the echo canceler coefficient logic, and operative to receive the noise suppressed uplink data and the filter coefficient data and in response to produce final uplink data;

a wireless transceiver, operatively coupled to the echo canceler filter and to the pre-noise suppression logic, and operative to receive the final uplink data from the echo canceler filter and in response to transmit the final uplink data, and to receive the downlink data and in response to provide the downlink data to the pre-noise suppression logic;

an audio system including:

an amplifier, operatively coupled to the wireless transceiver and to the pre-noise suppression logic, and operative to receive the downlink data, and in response, to produce an amplified downlink audio signal; and

a playback module including at least one of: a tuner module, a tape player, a CD player and a DVD player, operatively coupled to the amplifier, and operative to provide at least a playback audio signal to the amplifier.

14. The in-vehicle communication system of claim 13 wherein the wireless transceiver is at least one of a wireless wide area network transceiver, a wireless local area network transceiver and a wireless device.

15. The in-vehicle communication system of claim 13 wherein the pre-noise suppression logic includes a pre-noise suppression echo canceler adaptive filter.

16. The in-vehicle communication system of claim 13 wherein the pre-echo canceler uplink data includes echo component data, such that the echo canceler filter produces the final uplink data with reduced echo component data.

17. The in-vehicle communication system of claim 13 wherein the pre-echo canceler uplink data includes echo component data and noise component data, such that the final uplink data includes reduced echo component data and reduced noise component data.

18. A method to reduce echo data comprising:

producing pre-noise suppression uplink data in response to downlink data and pre-echo canceler uplink data;

producing filter coefficient data in response to the pre-noise suppression uplink data and the pre-echo canceler uplink data;

producing noise suppressed uplink data in response to the pre-noise suppression uplink data; and

producing final uplink data in response to the noise suppressed uplink data and the filter coefficient data.

19. The method of claim 18 wherein the pre-echo canceler uplink data includes echo component data, such that the final uplink data is produced with reduced echo component data.

20. The method of claim 18 wherein the pre-echo canceler uplink data includes noise component data, such that the final uplink data is produced with reduced noise component data.

21. The method of claim 18 wherein the pre-echo canceler uplink data includes echo component data and noise component data, such that the final uplink data is produced with reduced echo component data and reduced noise component data.

22. Memory containing instructions executable by one or more processing devices that causes the one or more processing devices to:

produce pre-noise suppression uplink data in response to downlink data and pre-echo canceler uplink data;

produce filter coefficient data in response to the pre-noise suppression uplink data and the pre-echo canceler uplink data;

produce noise suppressed uplink data in response to the pre-noise suppression uplink data; and

produce final uplink data in response to the noise suppressed uplink data and the filter coefficient data.

23. The memory of claim 22 containing executable instructions that cause the one or more processing devices to:

receive noise component data and echo component data in the pre-echo canceler uplink data; and

produce the uplink data with reduced echo component data and reduced noise component data in response to receiving the noise component data and the echo component data.